

DANIEL JOHNSON, JR. (SBN 57409)
BRETT M. SCHUMAN (SBN 189247)
MORGAN, LEWIS & BOCKIUS LLP
One Market, Spear Street Tower
San Francisco, CA 94105-1126
Tel: 415.442.1000
Fax: 415.442.1001
djjohnson@morganlewis.com
bschuman@morganlewis.com

ANDREW J. WU (SBN 214442)
DAVID V. SANKER (SBN 251260)
MORGAN, LEWIS & BOCKIUS LLP
2 Palo Alto Square
3000 El Camino Real, Suite 700
Palo Alto, CA 94306-2122
Tel: 650.843.4000
Fax: 650.843.4001
awu@morganlewis.com
dsanker@morganlewis.com

Attorneys for Plaintiffs and Counterdefendants
ALPHA & OMEGA SEMICONDUCTOR, LTD.
ALPHA & OMEGA SEMICONDUCTOR, INC.

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

ALPHA & OMEGA SEMICONDUCTOR,
LTD., a Bermuda corporation; and
ALPHA & OMEGA SEMICONDUCTOR,
INC., a California corporation,

Plaintiffs and Counterdefendants,

v.

FAIRCHILD SEMICONDUCTOR
CORP., a Delaware corporation,

Defendant and Counterclaimant.

AND RELATED COUNTERCLAIMS.

Case No. C 07-2638 JSW
(Consolidated with Case No. C-07-2664 JSW)

**AOS'S OPPOSITION CLAIM
CONSTRUCTION BRIEF PURSUANT TO
PATENT L.R. 4-5**

Date: June 4, 2008
Time: 2:00 p.m.
Location: Courtroom 2, 17th Floor
Judge: Hon. Jeffrey S. White

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. BACKGROUND	2
A. The Mo Patents	2
1. The Purported Invention	2
2. The Prosecution History	3
B. The '947 Patent	3
III. INTERPRETATION OF DISPUTED TERMS	4
A. The Mo Patents ('481, '406, '497, 195, and '111)	4
1. The Court Should Reject Fairchild's Proposed Definition Of The Term "Abrupt Junction" And Adopt AOS's Proposed Definition	5
a. AOS's Proposed Construction Is Based Squarely On The Definition Used By The Inventors To Obtain The Patents, And Is Otherwise Consistent With The Claim Language And Specifications	5
b. Fairchild's Proposed Construction Is Inconsistent With The Prosecution History And The Other Intrinsic Evidence	7
c. Other Problems With Fairchild's Proposed Claim Construction And Supporting Argument	8
2. The Court Should Adopt AOS's Proposed Construction Of The Disputed Phrase "Resulting In Avalanche Current That Is Substantially Uniformly Distributed"	10
a. Because Structures In The Termination Region Draw Avalanche Breakdown Current Away From The Active Region Of The Device, The Uniform Distribution Of Avalanche Current Must Include The Termination Region	11
b. The Patent Supports The Portion Of AOS's Proposed Construction That Requires The Measurement Of Breakdown Current At Breakdown Initiation	12
3. The Term "Adjusting" Must Be Construed, And The Court Should Adopt AOS's Proposed Construction	13
a. The Claim Language, Specification, And Prosecution History Require That "Adjusting" Be Performed With The Intent To Affect The Peak Electric Field	14
b. "Adjusting" Involves Repeated Experiments Or Computer Simulation	15
c. Moving The Breakdown Initiation Point Away From The Trench Should Be Interpreted To Mean Toward The Center Of The Body Region Of The Device	16
d. The Court Should Reject Fairchild's Attempt To Eliminate The "Adjusting" Limitation From The Claims	17
B. The '947 Patent	17

TABLE OF CONTENTS
(continued)

		Page
1.	The Court Should Reject Fairchild's Obvious Attempt To Broaden The Meaning Of The Term "Acting As A Field Plate" And Adopt AOS's Proposed Construction.....	17
a.	The Claims And Specification Require That The Conductive Ring Must Be Formed Completely In A Trench.....	18
b.	The Field Plate Must Modify The Depletion Layer In The Underlying Silicon	19
2.	The Court Should Reject Fairchild's Attempt To Define "Same" As Including "Different"	21
3.	The Court Should Adopt AOS's Construction Of The Term "Isolation Trench" And Reject Fairchild's Proposed Construction; Fairchild's Proposed Construction Is Based Principally – And Improperly – On Extrinsic Evidence From Its Expert Witness.	22
a.	An Isolation Trench Must Actually Be A Trench.....	23
b.	An Isolation Trench – Like Any Other Trench - Must Have Two Sidewalls.....	23
IV.	CONCLUSION.....	25

TABLE OF AUTHORITIES

Cases

<i>Advanced Display Sys., Inc. v. Kent State Univ.</i> , 212 F.3d 1272 (Fed. Cir. 2000).....	20
<i>ASM America, Inc. v. Genus, Inc.</i> , 2002 WL 1892200, *15 (N.D.Cal. 2002)	5
<i>Biagro Western Sales, Inc. v. Grow More, Inc.</i> , 423 F.3d 1296 (Fed. Cir. 2005).....	1
<i>CCS Fitness, Inc. v. Brunswick Corp.</i> , 288 F.3d 1359 (Fed. Cir. 2002).....	7
<i>Combined Sys. v. Def. Tech. Corp of America</i> , 350 F.3d 1207 (Fed. Cir. 2003).....	15
<i>Grantley Patent Holdings, v. Clear Channel Commc'ns, Inc.</i> , 2008 U.S. Dist. LEXIS 1588, *17 (E.D. Tex. 2008)	20
<i>Innova/Pure Water, Inc. v. Safari Water Filtration Sys.</i> , 381 F.3d 1111 (Fed. Cir. 2004).....	17
<i>Koito Mfg Co., v. Turn-Key-Tech, LLC</i> , 381 F.3d 1142 (Fed. Cir. 2004).....	15
<i>Markman v. Westview Instruments, ,</i> 517 U.S. 370 (1996).....	11
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005).....	11, 19, 25
<i>Rockwell Int'l Corp. v. United States</i> , 147 F.3d 1358 (Fed. Cir. 1998).....	3
<i>Springs Window Fashions LP v. Novo Indus., L.P.</i> , 323 F.3d 989 (Fed. Cir. 2003).....	1
<i>Vitronics Corp. v. Conceptronic, Inc.</i> , 90 F.3d 1576 (Fed. Cir. 1996).....	18

1 **I. INTRODUCTION**

2 In its opening claim construction brief, Fairchild Semiconductor Corporation (“Fairchild”)
3 readily acknowledges the well-settled rules for claim construction and then proceeds immediately
4 to ignore them. Instead of focusing on the intrinsic evidence, *i.e.*, claim language, patent
5 specifications, and the prosecution histories of the Fairchild patents-in-suit, Fairchild relies
6 heavily – and, at times, exclusively – on a twenty-eight page declaration from its hired expert, Dr.
7 Richard Blanchard.

8 Fairchild’s proposed claim constructions should be rejected. The testimony of Dr.
9 Blanchard cannot make up for the fact that Fairchild’s proposed constructions are unsupported
10 (and unsupportable) based on the intrinsic evidence. *E.g.*, *Biagro Western Sales, Inc. v. Grow*
11 *More, Inc.*, 423 F.3d 1296, 1302-3 (Fed. Cir. 2005) (rejecting claim construction based “heavily”
12 on expert testimony, and stating: “[e]xtrinsic evidence, such as expert testimony, may be useful in
13 claim construction, but it should be considered in the context of the intrinsic evidence”). Further,
14 much of Dr. Blanchard’s declaration is simply technically inaccurate, as explained by AOS’s
15 expert, Dr. C. Andre T. Salama in a declaration being filed concurrently with this brief.

16 In contrast, AOS proposes constructions that are rooted firmly in the claim language,
17 specifications and prosecution histories. The prosecution history is particularly relevant to
18 construction of the five Fairchild patents that are all based on the application filed in November
19 1997 by Brian Sze-Ki Mo because the five resulting “Mo patents” were issued only after years of
20 rejections and amendments by and between the applicants and the U.S. Patent Office.¹ A
21 principal focus of the battle between the applicants and the PTO was the very terms now at issue
22 in this litigation, including the key term “abrupt junction.” All of this prosecution history is
23 binding on Fairchild. *See Springs Window Fashions LP v. Novo Indus., L.P.*, 323 F.3d 989, 995
24 (Fed. Cir. 2003) (“The public notice function of a patent and its prosecution history requires that a
25 patentee be held to what he declares during the prosecution of his patent”).

26 Of the six terms to be construed with respect to the Fairchild patents-in-suit, three relate to
27 the Mo patents and the other three relate to U.S. Patent No. 6,818,947 (“the ‘947 patent”).

28 ¹ U.S. Patent Nos. 6,429,481; 6,521,497; 6,710,406; 6,828,195; and 7,148,111.

1 Although Fairchild's proposed constructions for the terms relating to the '947 patent purport to be
 2 based more on the intrinsic evidence than its constructions for the Mo patents, the intrinsic
 3 evidence does not actually support Fairchild's proposed constructions here either. Rather, as
 4 demonstrated below, the intrinsic and extrinsic evidence supports AOS's proposed constructions
 5 of the three terms relating to the '947 patent.

6 **II. BACKGROUND**

7 **A. The Mo Patents**

8 **1. The Purported Invention**

9 The Mo patents purport to describe and claim a method for protecting a power MOSFET
 10 device from the effects of a phenomenon known as "avalanche breakdown." Avalanche
 11 breakdown is an unwanted process that occurs when a sufficiently high voltage is applied to a
 12 MOSFET, creating electric fields strong enough to cause a moving electron to break others free,
 13 resulting in an uncontrollable cascade of electrical current through the MOSFET even when it is
 14 switched off. *See* Declaration of C. Andre T. Salama, submitted herewith ("Salama Opp. Decl."),
 15 ¶ 4. The moment when an electron first breaks free and begins the avalanche process is called
 16 "breakdown initiation." *Id.* at ¶ 5. The point where this process begins is called the "breakdown
 17 initiation point." The breakdown initiation point will be found where the electric fields are
 18 strongest, that is, at the "peak electric field." *Id.* If increasing voltage is applied to the device,
 19 breakdown can spread rapidly among the cells; within each cell, breakdown can start at one point
 20 in the cell, and then, as the voltage is increased, spread to other parts of the cell. *Id.* at ¶ 6. If
 21 enough voltage is applied after breakdown initiation, current-paths can form through any number
 22 of undesired pathways within the transistor. *Id.* Avalanche breakdown can damage the gate
 23 oxide layer covering the interior surface of the gate trenches. *Id.* at ¶ 4.

24 To prevent avalanche breakdown from damaging the gate oxide, the prior art taught
 25 techniques for controlling where in the device breakdown initiation occurs. *See* Declaration of
 26 Yalei Sun submitted herewith ("Sun Decl."), Ex. 1, '481 patent, at col. 1:15-21. According to the
 27 Mo specification, this was typically done by having the bottom of the heavy body structure
 28 deeper than the bottom of the gate trench in the substrate so as to move the breakdown initiation

1 point near the bottom of the heavy body and away from the bottom of the gate trench. *Id.*

2 The Mo patents purport to claim a different method for moving the breakdown initiation
3 point: the creation of a so-called “abrupt junction” between the heavy body and the well in each
4 transistor cell. According to the teaching of the patents, the depth of the “abrupt junction” must
5 be “adjusted” so that peak electric field is induced near the abrupt junction, thereby moving the
6 breakdown initiation point away from the gate trench. *Id.* at col. 2:34-37.

7 2. The Prosecution History.

8 Although the application for the Mo patents was filed on November 14, 1997, no claims
9 were issued until August 6, 2002. During almost five years of prosecution, the Examiner rejected
10 all of the proposed claims at least four times as either anticipated by or unpatentable over prior
11 art. The applicants ultimately persuaded the Examiner to issue the patents based on constructions
12 of the key term “abrupt junction” and the “adjusting” element that the Court is now called upon to
13 construe. To persuade the Examiner to issue the patents, the applicants relied almost exclusively
14 on definitions and explanations provided in the textbook “Physics of Semiconductor Devices” by
15 S.M. Sze (“the Sze book”). Sun Decl. Ex. 14. Therefore, this reference – ignored by Fairchild in
16 its opening brief – is a particularly relevant guide to construction of the disputed claim terms. *See*
17 *Rockwell Int’l Corp. v. United States*, 147 F.3d 1358, 1363 (Fed. Cir. 1998) (holding a patentee to
18 the definition of a term in a journal article when the patent applicant cited the article to explain
19 the term).

20 B. The ‘947 Patent.

21 The ‘947 patent purports to claim a method for reducing the number of elements needed to
22 make a power transistor by combining a gate runner and a field plate into one structure. ‘947
23 patent at col. 2:42-47. As described in the background section of the ‘947 patent, one of the
24 factors limiting a power MOSFET’s performance is the low breakdown voltage in the termination
25 region of the device. ‘947 patent at col. 1:29-31. The “termination region” of a power MOSFET
26 is the portion of the die surrounding the active region of the device, generally on the periphery of
27 the device. Salama Opp. Decl. ¶ 7. The termination region includes termination structures (*e.g.*,

1 field plate, channel stop, and field ring). *Id.* These termination structures help to increase a
 2 power MOSFET's breakdown voltage by modifying the "depletion layer" between the body and
 3 the drain in the termination region. *Id.* In the termination region, the depletion layer curves
 4 around the end of the p-type well. Salama Opp. Decl. at ¶ 8. The curvature of a depletion layer
 5 affects the termination region's breakdown voltage: generally, the higher the depletion layer
 6 curvature the lower the breakdown voltage, and *vice versa*. *Id.*

7 The prior art taught several techniques for avoiding high depletion layer curvatures. '947
 8 patent, col. 1:31-34. Edge termination structures, such as field rings, channel stop implants, and
 9 field plates, were used. *Id.* at col. 1:34-39; *see also* Salama Opp. Decl. ¶ 9. The prior art also
 10 taught the use of trenched field plates for this purpose. '947 patent, col. 1:52-54.

11 According to the '947 patent, prior art techniques did not utilize the substrate surface
 12 efficiently because field plate and gate runner structures² were allegedly two separate structures in
 13 the termination region. '947 patent at col. 5:35-36. The invention of the '947 patent was a
 14 purportedly improved edge termination design that combines the field plate and the gate runners
 15 into one trenched structure. *Id.* at col. 2:42-47.

16 **III. INTERPRETATION OF DISPUTED TERMS**

17 **A. The Mo Patents ('481, '406, '497, 195, and '111)**

18 One of the key terms to be construed from the Mo patents is the term "abrupt junction."
 19 AOS contends the term is indefinite and that this indefiniteness is a fatal defect that invalidates
 20 the '481, '406, and '195 patents.³

21 The term "abrupt junction" is indefinite because it is used in the specification of the Mo
 22 patents to describe an electrical transition between a heavy body structure and a well of the same
 23 conductivity type (*see, e.g.,* '481 patent, at col. 5:26-28). However, the prosecution history shows
 24 that the applicants were using the term in the more commonly understood way: to describe an

25 ² Power MOSFETs typically have a gate runner that rings the periphery of the device. Additional
 26 gate runners may also extend in a straight line across the active region of a MOSFET, such as
 those the parties discuss with regard to AOS's '567 patent.

27 ³ Although Fairchild asserts that AOS waived this defense, AOS properly identified this defense
 in its Supplemental Patent L.R. 3-3 Disclosure. Sun Decl., Ex. 25 at 204, 207, and 209
 (identifying AOS's indefiniteness defense based on "abrupt junction"). AOS's original Patent
 28 L.R. 3-3 Disclosure also identified AOS's indefiniteness defense. Sun Decl., Ex. 28 at 207-209.

1 electrical transition between different portions of the transistor of opposite conductivity types,
 2 which is a p-n junction. *See* Sun Decl., Ex. 1 (“June 7, 2001 Response”) at 5-7 (citing portions of
 3 the Sze book discussing abrupt p-n junctions). Because the prosecution history suggests the
 4 inventors meant one thing when they used the term “abrupt junction” and the specification for the
 5 Mo patents suggests they were using it to claim something very different, the claims are
 6 indefinite. *See* Salama Opp. Decl. ¶ 15.

7 “There is some ambiguity in the case law as to whether a finding of indefiniteness should
 8 occur during claim construction, or whether it should occur at a later step.” *ASM America, Inc. v.*
 9 *Genus, Inc.*, 2002 WL 1892200, *15 (N.D.Cal. 2002). Courts in this district have resolved this
 10 ambiguity by at least attempting to construe allegedly indefinite terms, and later entertaining
 11 dispositive motions based on invalidity. Accordingly, AOS has proposed a construction for the
 12 term “abrupt junction” without waiving its right to move for summary judgment later on
 13 indefiniteness or other grounds.

14 **1. The Court Should Reject Fairchild’s Proposed Definition Of The**
 15 **Term “Abrupt Junction” And Adopt AOS’s Proposed Definition**

16 The dispute regarding the term “abrupt junction” is as follows:

Disputed Term	AOS’s Proposed Construction	Fairchild’s Proposed Construction
wherein the heavy body forms an abrupt junction with the well	the doping concentration gradient at the junction between the heavy body and the well is sufficiently high that further increasing the doping concentration gradient does not further reduce the breakdown voltage between the well and the substrate. A linearly graded junction is not an abrupt junction.	The transition between the heavy body and the well occurs over a short distance relative to the depth of the well.

24 As discussed below, AOS’s proposed construction is mandated by the statements of the inventors
 25 during the prosecution history, and is well-supported by other intrinsic evidence.

26 **a. AOS’s Proposed Construction Is Based Squarely On The**
 27 **Definition Used By The Inventors To Obtain The Patents, And**
 28 **Is Otherwise Consistent With The Claim Language And Specifications**

1 In response to a rejection by the Examiner, the inventors of the Mo patents stated “[t]he
2 details of the definition and structural properties of the abrupt junction versus the linearly graded
3 junction were previously provided in the 6/7/01 response at pages 5-7, and will not be repeated.”
4 Sun Decl. Ex. 12 (“Dec. 31, 2001 Amendment”) at 2.⁴ In their June 7, 2001 response to the
5 Examiner, the inventors defined “abrupt junction” as follows:

6 Accordingly, referring to Fig. 31 of Sze (reproduced above for convenient
7 reference), for a given background doping N_B , the breakdown voltage V_B is
8 lowered (parallel lines) as the impurity gradient a increases until it comes to a limit
9 at the point (on the bottom line) where the impurity gradient a reaches an abrupt
10 junction, after which V_B [breakdown voltage] remains constant.

11 Sun Decl., Ex. 11 (“June 7, 2001 Response”) at 7. In other words, as the dopant concentration
12 gradient a increases, the breakdown voltage is lowered, until the gradient comes to a limit where
13 the breakdown voltage will go no lower – at that point, the gradient has reached an abrupt
14 junction. Simply paraphrasing this statement, AOS’s construction requires that the doping
15 concentration is “sufficiently high that further increasing the doping concentration gradient does
16 not further reduce the breakdown voltage.”

17 AOS’s construction that “an abrupt junction is not a linearly graded junction” is likewise
18 drawn squarely from the prosecution history. In the same June 7, 2001 response, the inventors
19 discussed “two limiting cases: the abrupt and the linearly graded junction.” *Id.* at 5-6 (quoting
20 Sze). The inventors referred the Examiner to “a detailed analysis of the characteristics of the
21 ‘abrupt’ junction versus the ‘linearly graded’ junction.” *Id.* at 6. The inventors then quoted a
22 discussion from Sze providing an equation for the breakdown voltage of an abrupt junction and
23 an equation for a linearly graded junction.⁵ *Id.* In light of these repeated and unambiguous
24 distinctions between an abrupt junction and a linearly graded junction, an “abrupt junction”
25 cannot be construed to encompass a linearly graded junction. For the same reasons, Fairchild’s

26 ⁴ Throughout this brief, any emphasis in quoted material was added to the original text unless
27 indicated otherwise.

28 ⁵ The abrupt junction discussed in the Sze book is a P-N junction between semiconductor
materials of opposite conductivity types, not a junction between semiconductor materials of the
same conductivity type. The Sze book’s definition of a P-N abrupt junction is indeed widely
accepted by scientific literature and technical dictionaries. The junction between the “heavy
body” and the “well” in the Mo patents, however, is not a P-N junction. It is called a high-low
junction. Unlike a P-N junction, there is no avalanche breakdown at a high-low junction. *See*,
e.g., Salama Opp. Decl. ¶¶ 10, 14. *See also* Sun Decl. Exs. 15 – 18.

current suggestion that AOS's construction is unclear because of purported confusion as to what constitutes a linearly graded junction must be rejected – the inventors expressly identified and distinguished both types of junctions in the prosecution history. *See* Fairchild's Opening Claim Construction Brief ("Fairchild Br.") at 10:1-5. Indeed, even if AOS's construction based on Sze were not the ordinary meaning of "abrupt junction," it would still be the proper construction because the inventors acted as their own lexicographer during the prosecution. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) ("the claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history").

b. Fairchild's Proposed Construction Is Inconsistent With The Prosecution History And The Other Intrinsic Evidence

Not only does Fairchild's proposed construction fail to recognize the inventors' express definition of "abrupt junction" in the prosecution history, but it fails to account for the two specific factors that determine whether a junction is linearly graded or abrupt. In an Oct. 18, 2001 amendment, the inventors stated that "whether a junction is linearly graded or abrupt depends on several different but inter-dependent variables including background doping concentration, target breakdown voltage, etc. as explained by Sze." Dec. 31, 2001 Amendment at 3. The inventors reiterated this list a few years later in an appeal brief for another Mo application: "Sze explains that whether a junction is abrupt or linearly graded depends on a number of different but interdependent variables, including background doping concentration, target breakdown voltage, etc." Sun Decl. Ex. 13 ("Appeal Brief") at 8.

AOS's proposed definition includes both of these factors, but Fairchild's proposed definition includes neither. AOS's definition includes these factors because they are an inherent part of the proposed construction: "further increasing the doping concentration gradient does not further reduce the breakdown voltage between the well and the substrate." To the extent background doping affects the breakdown voltage, the test incorporates the factors identified by the inventors.

These two factors that identify abrupt junctions are conspicuously lacking from

1 Fairchild's proposed definition. Significantly, both Fairchild's opening brief and the
 2 accompanying Blanchard Declaration are bereft of *any* supporting citation to the critical intrinsic
 3 evidence of the Mo patents. Fairchild has completely ignored the extensive prosecution history
 4 canvassed here. While Fairchild and Blanchard reference Figure 5 from the '481 patent, they
 5 have added annotations for purposes of this litigation purporting to identify the "abrupt junction."
 6 In essence, Fairchild is attempting improperly to manufacture intrinsic evidence where there is
 7 none supporting its claim construction.

8 **c. Other Problems With Fairchild's Proposed Claim Construction**
 9 **And Supporting Argument**

10 There are many other problems with Fairchild's proposed construction of the term "abrupt
 11 junction."

12 *First*, Fairchild improperly uses the prosecution history. *See* Fairchild Br., at 8:2-12.
 13 Fairchild relies on an early statement made by the inventors during prosecution that the Examiner
 14 found unpersuasive. The claims were rejected again and again, and were not issued until the
 15 inventors had made the statements in, *inter alia*, the June 7, 2001 Response and the Dec. 31, 2001
 16 Amendment distinguishing an abrupt junction from a linearly graded junction, and providing the
 17 other purported characteristics of an abrupt junction based on Sze. Having relied on the Sze text
 18 during prosecution to establish the structure and functionality of an abrupt junction, Fairchild
 19 cannot now disclaim it.

20 *Second*, Fairchild's proposed construction would require comparing the transition distance
 21 from the heavy body to the well with the depth of the well. That comparison is both scientifically
 22 irrelevant and unsupported by the intrinsic evidence. In particular, neither Fairchild's opening
 23 claim construction brief nor Dr. Blanchard's declaration explain why the proposed comparison
 24 would be relevant to identify an abrupt junction or how any intrinsic evidence would support
 25 making the comparison.

26 Whether a junction is abrupt or linearly graded depends on the steepness of the gradient at
 27 the junction, not the depth of the junction below the surface. There is no support in the intrinsic
 28 evidence for Fairchild's proposed comparison. Moreover, one of skill in the art would not

1 understand that comparison to be useful in identifying whether a junction is abrupt or not.

2 Salama Opp. Decl., ¶ 12.

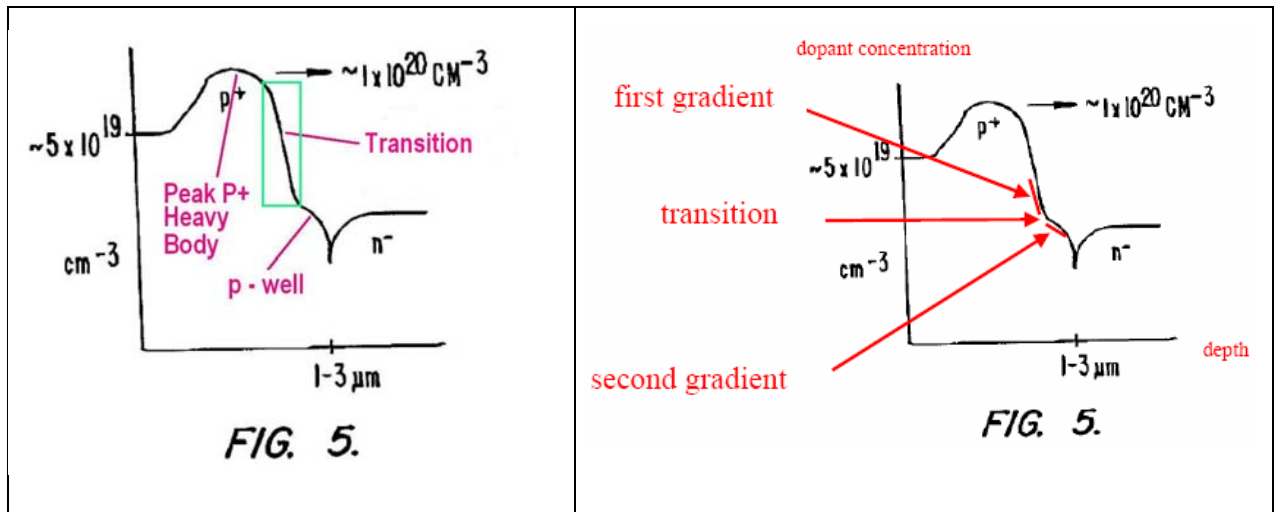
3 *Third*, Fairchild's proposed construction incorrectly identifies the “transition,” *i.e.*, the
4 junction, between the heavy body and the well. Dr. Blanchard presents an analogy that is
5 illuminating in the sense that it reveals the problem with *Fairchild's* proposed definition. Dr.
6 Blanchard says the transition between two regions in a semiconductor device is like the transition
7 between a street and a sidewalk. *See* Blanchard Decl., ¶ 34. The transition is abrupt if there is a
8 curb, but linearly graded if there is a ramp. *Id.*

9 Having provided an apt analogy, Dr. Blanchard and Fairchild fail to apply it. The
10 inventors explained the “abrupt transition” between the heavy body and the well referring to
11 Figure 5 of the patent:

12 Notice that the peak p+ heavy body is at a predetermined depth in the p-well and
13 changes rapidly in a short further depth (*i.e.* has a steep doping concentration
gradient) to form the abrupt transition with the p-well.

14 Sun Decl. Ex. 9 (“Sept. 5, 2000 Amendment”) at 8. This is shown in the modified version of
15 Figure 5 from the ‘481 patent, shown below on the left. In this figure, the vertical axis represents
16 the doping concentration, while the horizontal axis indicates the depth. The portion of the heavy
17 body with the highest doping concentration is labeled “Peak p+ heavy body.” The abrupt
18 junction, shown in the green rectangle, is the change in doping concentration over the short
19 distance between the peak p+ heavy body and the p- well. In Dr. Blanchard’s analogy, the heavy
20 body is the sidewalk, the well is the street, and the junction between them is “abrupt” if it is steep
21 enough to be a curb, rather than a ramp.

22 In contrast, Fairchild (relying exclusively on Dr. Blanchard’s declaration) now identifies a
23 different and smaller portion of the gradient as the “abrupt junction.” This is shown in the figure
24 on the right below:



Fairchild and Dr. Blanchard incorrectly identify the “transition” as a “corner” (with “an abrupt change in slope over a short distance where the transition occurs”) in the figure from the ‘481 patent. Blanchard Decl. ¶ 35, 38. In contrast to his own analogy, Dr. Blanchard is now judging whether the junction is abrupt based on whether there is a “corner” between the ramp and the street, rather than whether the ramp is steep enough to be a curb. That methodology is contrary to both the prosecution history and Dr. Blanchard’s own analogy, and should be rejected. Salama Opp. Decl. ¶ 11.

Fourth, Fairchild’s proposed claim construction provides no objective measure of what constitutes an abrupt junction and therefore would only exacerbate the existing indefiniteness problem with the Mo patents. The phrase “short relative to the depth of the well” is subjective and would not provide sufficient information to a person of ordinary skill in the art regarding the meaning of the claims using the term. Salama Opp. Decl., ¶ 12.

2. The Court Should Adopt AOS’s Proposed Construction Of The Disputed Phrase “Resulting In Avalanche Current That Is Substantially Uniformly Distributed”

The parties dispute the following term from claim 29 of the ‘111 patent:

Disputed Term	AOS’s Proposed Construction	Fairchild’s Proposed Construction
resulting in avalanche current that is substantially uniformly distributed	The avalanche current at breakdown initiation is roughly uniformly distributed across the entire device	Resulting in avalanche current that is approximately evenly distributed across the active region of the device

a. **Because Structures In The Termination Region Draw Avalanche Breakdown Current Away From The Active Region Of The Device, The Uniform Distribution Of Avalanche Current Must Include The Termination Region**

AOS's proposed definition, which requires uniform distribution of avalanche current across the entire device, *i.e.*, the active and termination regions, is supported by the claim language. *First*, the preamble to claim 29 states that it is a method of manufacturing a trench transistor. Sun Decl., Ex. 5 ("the '111 patent") at col. 10:45 – col. 11:10. Since a transistor has both an active region and a termination region, the method applies to avalanche current in both regions. *Second*, the claim language "uniformly distributed" implies that it involves all of the avalanche current. *Third*, there is no language in the claim that expressly limits the location of avalanche current to anything less than the entire device.

AOS's proposed construction also is supported by the specification. While the claims are not limited to the preferred embodiments of the specification, "claims must be read in view of the specification, of which they are a part." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (citation omitted); *see also Markman v. Westview Instruments*, , 517 U.S. 370, 371-73 (1996). Further, "[t]he construction that stays true to the claim language and most naturally aligns with the patent's description of the invention will be, in the end, the correct construction." *Phillips*, 415 F.3d at 1316.

The specification states that the avalanche current is drawn from the active region to the periphery:

the cell array is surrounded by a field termination junction 40 which increases the breakdown voltage of the device and draws⁶ avalanche current away from the cell array to the periphery of the die.

'111 patent, col. 5:34-37. As shown in Figure 2 of the '111 patent, the field termination junction 40 is in the termination region of the transistor. Because some of the avalanche current flows through the termination region, the "uniform distribution" of avalanche current must include the termination region.

⁶ In the '111 patent, this was mistranscribed as "thaws."

b. **The Patent Supports The Portion Of AOS's Proposed Construction That Requires The Measurement Of Breakdown Current At Breakdown Initiation**

While AOS proposes that the avalanche current must be substantially uniformly distributed at the time of breakdown initiation, Fairchild contends that the distribution need not be uniform at any specific time. *See* Fairchild Br. at 11. But to determine if the current is substantially uniform, one must pick a time at which to measure it.

The patent makes clear that the time at which the avalanche current should be measured is the time of breakdown initiation. The claim element recites:

adjusting a dopant profile of the plurality of heavy body regions so that peak electric field is moved away from a nearby trench toward the heavy body resulting in avalanche current that is substantially uniformly distributed.

Sun Decl. Ex. 5 ('111 patent) at claim 29 (col. 11:6-10). The specification explains that moving the peak electric field to the junction between the heavy body and the well is related to the initiation of "avalanche multiplication":

an abrupt junction at the interface between the p+ heavy body and the p-well causes the peak electric field to occur in that area of the interface. Avalanche multiplication initiates at the location of the peak electric field, thus steering hot carriers away from the sensitive gate oxide and channel regions.

Id. at col. 5:22-27. "Initiation" is a reference to a specific point in time: the time of breakdown initiation. The specification does not discuss moving the peak electric field in connection with breakdown at any point in time other than breakdown initiation.

Further, the inventors emphasized the importance of "breakdown initiation" during the prosecution history. For example, the inventors said "[t]he foregoing summaries of both the present invention and Hsieh reveal that a common problem addressed by both relates to moving the point of breakdown initiation away from the vicinity of the transistor's trench(es)." Sun Decl. Ex. 9 ("Sept. 5, 2000 Amendment") at 9. In the June 7, 2001 Response, the inventors said that "[a]pplicants are entitled to claim this structural aspect of the present invention (*i.e.*, relative depths of the heavy body and the well), that is also further defined functionally (impacting breakdown initiation point)...." In fact, the prosecution history of the first Mo patent refers to "breakdown initiation" 18 times. Sun Decl. Exs. 7 – 12. Conversely, there are no statements in the prosecution history that suggest measuring avalanche breakdown at any time other than

breakdown initiation.

Moreover, AOS's construction is required for the claim to make technical sense. The uniform distribution of avalanche current must be a result of adjusting the dopant profile, and measuring the uniform distribution at any time after breakdown initiation would vitiate this limitation. *See* '111 patent at claim 29 (col. 11:7-11). After initiation of breakdown, if higher and higher voltage is applied to the device, further breakdown will occur. *See* Salama Opp. Decl., ¶ 6. For example, if breakdown were to initiate at the edge of the trench, increasing the voltage could cause a subsequent breakdown at the junction between the heavy body and the well. *Id.* at ¶¶ 5, 6. If the applied voltage is high enough, breakdown could occur at the junction between the heavy body and the well, regardless of the doping profile and regardless of whether the device employs the purported invention of the Mo patents. *See id.* Accordingly, if the breakdown recited in the claim refers to breakdown subsequent to initiation, the claim element could encompass any dopant profile. *See id.* at ¶ 5. Breakdown could occur practically anywhere in the device if higher and higher voltage is applied subsequent to the initiation of breakdown, so the dopant profile would not affect the distribution of avalanche current. *See id.* at ¶ 5. For this reason, among others, one of skill in the art would be concerned with avalanche current at breakdown initiation, not some subsequent breakdown. *Id.*

3. The Term "Adjusting" Must Be Construed, And The Court Should Adopt AOS's Proposed Construction

Fairchild argues this term need not be construed – despite the plethora of evidence in the prosecution history bearing on the proper construction of the limitation. AOS's proposed construction is consistent with this prosecution history and the other intrinsic evidence.

Disputed Term	AOS's Proposed Construction	Fairchild's Proposed Construction
depth of the junction, relative to the depth of the well, is adjusted so that a transistor breakdown initiation point is spaced away from the trench in the semiconductor when voltage is applied to the transistor	selecting by repeated experiments or by computer simulation the relative depths of the well and the junction for the purpose of moving initiation of breakdown in the device toward the center of the body region between adjacent trenches	Fairchild does not believe construction of this term is required. The ordinary meaning should apply.

a. **The Claim Language, Specification, And Prosecution History Require That “Adjusting” Be Performed With The Intent To Affect The Peak Electric Field**

The intrinsic record establishes the causal relationship between “adjusting” and the result. *First*, the specification uses the word “selected” to identify a process to be performed on the relative depths of the heavy body and well. The specification states that the relative depth “is selected so that the peak electric field...” ‘481 patent, col. 2:29 – 32, 59 – 62; col. 5:8 – 12. The selection of the relative depths must cause the movement of the peak electric field.

Second, the prosecution history relieves any doubt about the required nexus. During prosecution, Fairchild consistently pointed out the causal relationship between the depths of the heavy body and well, on the one hand, and the breakdown initiation point, on the other. *See, e.g.*, June 7, 2001 Response at 16 (the depth “is adjusted to impact the location of breakdown initiation”).

The limitation of “adjusting” the relative depths of the heavy body and well was one of the inventors’ two key arguments for patentability. Dec. 31, 2001 Amendment at 2 – 6. The inventors distinguished their application over the prior art based on the purpose of the “adjusting” operation. When the inventors first added the “adjusting” limitation (initially using the verb “controlled”), they emphasized the purpose requirement to distinguish over the ‘120 patent to Hshieh⁷ prior art reference:

Hshieh's "P+ doped body contact region 18" is just that, a contact region. That is, the sole purpose of the "P+ doped body contact region 18" is "to promote electrical contact between the body region 14 and the overlying source-body metallization 30." [Hshieh '128, col. 3, lines 38-40]. Hshieh's contact region 18 is therefore relatively shallow and is not intended to impact the location of "the peak electric field" that may cause destructive breakdown when voltage is applied to the transistor. Amended claim 1, in contrast, defines the "doped heavy body" as having a depth that "is controlled so that the peak electric field, when voltage is applied to the transistor, will be spaced from the trench."⁸

Sun Decl., Ex. 8 (“Nov. 9, 1999 Amendment”) at 8. In other words, to obtain the Mo patents, the inventors explained that the depth of their heavy body was controlled to achieve a particular purpose.

⁷ Hshieh is an inventor on many patents, including the ‘776 and ‘630 patents asserted by AOS.

⁸ On June 7, 2001, the inventors amended the claims to replace “controlled” with “adjusted.” June 7, 2001 response at 9, 17, 18. Fairchild does not ascribe any significance to this change.

1 The inventors affirmed the requirement for purposeful action in subsequent
 2 communication with the Patent Office. To distinguish the application from U.S Patent No.
 3 5,629,543, the inventors argued:

4 Besides failing to teach that the p+ body contact region/body region junction is
 5 abrupt, it should be emphasized that there is nothing in Hshieh that teaches or
 6 suggests that the junction between these two regions is of a controlled depth for
 7 the purpose of localizing the point of breakdown initiation within the device.

8 Sun Decl. Ex. 9, (Sept. 5, 2000 Amendment) at 9. Five years later, the inventors continued to
 9 emphasize the requirement of purposeful action in an appeal brief for a Mo continuation. To
 10 argue for patentability based on the “adjusting” limitation, the inventors stated:

11 To be clear, claims 47, 69, and 98 recite that the “location of the abrupt junction”
 12 is adjusted for the recited purpose and one of skill in the art would readily
 13 understand that this is accomplished during fabrication.

14 Appeal Brief at 15.

15 The Federal Circuit enforces claim language where patent applicants have drafted claims
 16 that require purpose or intent. In *Koito Mfg Co., v. Turn-Key-Tech, LLC*, 381 F.3d 1142, 1145
 17 (Fed. Cir. 2004), a patent limitation required a “predetermined” flow direction. The Federal
 18 Circuit affirmed the district court’s construction that “predetermined” required intent or
 19 foreknowledge to establish the flow direction. *Id.* at 1150. In *Combined Sys. v. Def. Tech. Corp*
 20 *of America*, 350 F.3d 1207, 1208 (Fed. Cir. 2003), a patent limitation required “forming folds.”
 21 Relying on the claim language and specification, the Federal Circuit affirmed the district court’s
 22 construction that “forming folds” required the “deliberate and systematic creation of folds.” *Id.* at
 23 1209, 1214. Incidental “gathers” that occurred as part of the processing did not constitute
 24 “forming folds” because there was no deliberate action. *Id.* at 1214.

25 **b. “Adjusting” Involves Repeated Experiments Or Computer**
 26 **Simulation**

27 Fairchild wrongly accuses AOS of interpreting the term “adjusting” by using a “wholly
 28 fabricated phrase ‘selecting by repeated experiments or by computer simulation.’” Fairchild Br.,
 at 14:15-22.

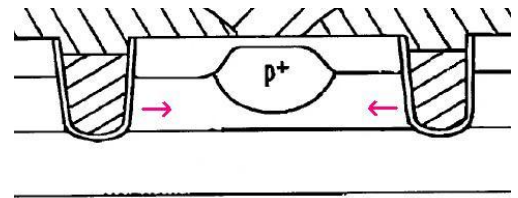
AOS’s proposed construction is based squarely on the specification. The specification
 describes two ways to perform the “adjusting” operation: “[t]he preferred relative depths of the

p+ heavy body, the p- well and the trench are different for different device layouts. However, preferred relative depths can be readily determined empirically (by observing the location of peak electric field) or by finite element analysis.” ‘481 patent, col. 5:12-17. “Repeated experiments” is a proper definition for empirical observations, and finite element analysis is one form of computer simulation. *See* Sun Decl. Ex. 26 (definition of finite element analysis from Wikipedia). Fairchild has proposed no other way to select the relative depths of the heavy body and well and the patent does not provide support for any other method.

c. **Moving The Breakdown Initiation Point Away From The Trench Should Be Interpreted To Mean Toward The Center Of The Body Region Of The Device**

Under AOS’s construction, breakdown initiation is moved “toward the center of the body region.” Within the active region of a trenched power MOSFET, moving away from trench is the same as moving toward the center between trenches.

The simple generic diagram to the right illustrates the point.



Again, the specification supports AOS’s construction. The specification of the ‘481 patent identifies only one location for the movement of the peak electric field: between adjacent trenches in the active region. The relative depth of the two regions “is selected so that the peak electric field when voltage is applied to the transistor will be approximately halfway between adjacent trenches.” ‘481 patent, col. 5:8 – 12.

Apparently, Fairchild intends to interpret “away from the trench” as including movement into the termination region. The proper construction of “away from the trench” in the disputed phrase must exclude movement into the termination region. Fairchild’s expert, Dr. Blanchard, acknowledges this:

it is the location of the heavy body regions between the trenches (and spaced apart from the trenches) that causes the peak electric field likewise to be located away from the trenches... The claimed invention causes the peak electric field to be centrally located beneath each heavy body region, which is located between adjacent trenches.

Blanchard Decl. ¶ 43.

To justify its overbroad construction, Fairchild misapplies the doctrine of claim

1 differentiation, arguing that under AOS's construction, there would be "virtually no difference"
 2 between claim 13, which recites the breakdown origination point "spaced away" from the
 3 trenches, and claim 15, which recites the breakdown origination point "approximately halfway
 4 between adjacent gate-forming trenches." Fairchild Br. at 16:12-26; Sun Decl. Ex. 2 ('406
 5 patent), claim 13 and 15. But AOS's construction of "toward the center" of the body region is not
 6 coextensive with "approximately halfway between the trenches." The breakdown origination
 7 could be toward the center, but not halfway or even approximately halfway between the trenches.
 8 Since there would still be a difference between the claims under AOS's construction, the doctrine
 9 of claim differentiation does not apply.

10 **d. The Court Should Reject Fairchild's Attempt To Eliminate The**
 11 **"Adjusting" Limitation From The Claims**

12 Fairchild provides no independent meaning for the term "adjusted." Instead, in
 13 Fairchild's view, the "adjusted" limitation is met if the breakdown initiation point is spaced away
 14 from the trench –without more. *See* Fairchild Br., at 13-14. This is tantamount to reading the
 15 limitation out of the claim improperly, making it easier for Fairchild to establish infringement.⁹
 16 Of course, the law does not authorize Fairchild's approach. The phrase "adjusting the relative
 17 depths" must mean something more than "existing." *See, e.g., Innova/Pure Water, Inc. v. Safari*
 18 *Water Filtration Sys.*, 381 F.3d 1111, 1119 (Fed. Cir. 2004) (holding that all claim terms are
 19 presumed to have meaning in a claim). As explained above, the specification identifies that
 20 adjusting involves selection by repeated experiments or computer simulation.

21 **B. The '947 Patent**

22 The '947 patent teaches combining a gate runner and a field plate into one structure in the
 23 termination region of a power MOSFET. Allegedly, this combination conserves space in the
 24 substrate of the power MOSFET. Sun Decl. Ex. 6 ("the '947 patent"), at col. 2:42-48.

25 **1. The Court Should Reject Fairchild's Obvious Attempt To Broaden**

26 ⁹ This is not merely speculation on AOS's part. In Fairchild's Preliminary Infringement
 27 Contentions, Fairchild accuses all AOS devices of infringing the '481 patent because "the depth
 28 of this abrupt junction relative to the depth of the well is such that the peak electric field causes
 the breakdown initiation point to be spaced away from the trench." For example, see Exhibit 2 of
 Fairchild's Preliminary Infringement Contentions that accuse AOS device AO4812. Sun Decl.
 Ex. 27.

The Meaning Of The Term "Acting As A Field Plate" And Adopt AOS's Proposed Construction.

Disputed Term	AOS's Proposed Construction	Fairchild's Proposed Construction
Acting as a field plate to extend the device breakdown voltage in the termination region.	A conductive ring formed in a trench in the termination region, resulting in a higher breakdown voltage in the termination region by modifying the depletion layer in the underlying silicon.	Acting as a conductive structure at or near the top surface of the substrate to increase breakdown voltage in the termination region.
Acts as a field plate termination.		Forming a conductive structure at or near the top surface of the substrate that increases breakdown voltage in the termination region.
Forming a field plate around the transistor regions.		

a. The Claims And Specification Require That The Conductive Ring Must Be Formed Completely In A Trench.

Each of the asserted independent claims of the '947 patent explicitly requires that the structure acting as a field plate be within a trench. For example, claim 5 requires:

forming first and second conductor regions such that said first and second conductor regions are electrically connected to form a continuous conductor with multiple regions and said first conductor regions is in said trenched transistor formation and said second conductor region is said trenched gate runner such that said second conductor also acts as a field plate termination.

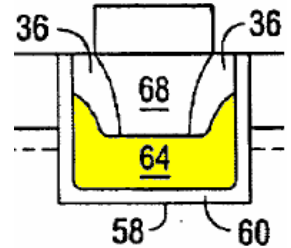
'947 patent at col. 7:9-16; *see also id.* at col. 6:31-34 (claim 1: "a feed comprising conductive material formed in a trench ... acting as a field plate"); col. 8:1-5 (claim 6: "a trench having an outer annular portion ... filled with conductive material for forming a field plate").¹⁰

The specification provides further support for AOS's proposed construction. It says: "A feature of the invention is provision of one trenched conductor to serve as both a field plate and a gate runner to the several MOS cells in a device structure." '947 patent at col. 4:43-46. The specification "is the single best guide to the meaning of a disputed term." *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996).

¹⁰ While AOS's construction refers to "conductive rings," Fairchild's construction encompasses "conductive structures." A field plate is only one of several structures used in the industry to increase breakdown voltage in the termination region. Other structures include, field rings, channel stop implants and other designs. *See* '947 patent at col. 1:34-36. On its face, the claims cover only "field plates" – not any of these other structures. *See id.* at 6:34-35; 7:14-15; and 8:4-6. Thus, Fairchild's attempt to broaden the scope of the claims to include other conductive "structures" besides field plates must be rejected.

1 In a transparent attempt to broaden the scope of its asserted claims, Fairchild suggests the
 2 field plate need only be located “at least partially within a trench.” Fairchild Br., at 20:22-24.
 3 This is the purpose of the “at or near the top surface of the substrate” portion of Fairchild’s
 4 proposed construction. Argument supporting Fairchild’s proposed interpretation is contained
 5 improperly in Dr. Blanchard’s declaration. *See* Blanchard Decl., ¶51.

6 The claim language itself defeats Fairchild’s proposed construction. According to
 7 Fairchild, the structure that acts as a field plate includes both the conductive material (64) and the
 8 contact area (68) in the trench (60) depicted in the figure to the right.¹¹ *See*



9 Fairchild Br. at 19:2-11. Because the contact area (68) extends out of the
 10 trench, Fairchild contends the field plate does not lie completely within the
 11 trench. However, the ‘947 patent teaches that the conductive material 64
 12 *alone* acts as a field plate. Claim 1 recites a “second conductor portion” including “a contact,”
 13 i.e., contact 68, and “a feed comprising conductive material formed in a trench,” i.e., conductive
 14 material 64. ‘947 patent at 6:27-31. The claim then clearly states that *only* the feed comprising
 15 conductive material – area 64 – acts as a field plate.¹² *See id.* at col. 6:30-35.¹³ The specification
 16 further undermines Fairchild’s proposed construction: consistent with the claim language, the
 17 specification says that “the trenched conductive material 64 extends along the die edge 52 to
 18 provide a field plate termination.” *Id.* at col. 4:33-35. The contact 68 serves only to connect the
 19 gate voltage supply to the conductive material, *id.* at col. 4:36-38, and, per the claim language and
 20 the specification, is not part of the structure acting as the “field plate.”

21 **b. The Field Plate Must Modify The Depletion Layer In The**
 22 **Underlying Silicon.**

23 The invention claims a conductive feed that “acts as a field plate.” To describe a field
 24 plate, the specification incorporates by reference the textbooks Modern Power Devices (the

25 ¹¹ This is a colorized portion of Figure 1 of the ‘947 patent.

26 ¹² During prosecution, the inventors amended claim 1 to move the phrase “acting as a field plate”
 into the paragraph describing a feed comprising conductive material (i.e., area 64). *Compare* Sun
 Ex. 23, at 2, *with* Sun Ex. 24, at 2:14-18.

27 ¹³ While neither claim 5 nor claim 6 addresses the distinction between the conductive material 64
 and the contact 68, terms should be construed consistently across claims. *See Phillips*, 415 F.3d
 at 1314.

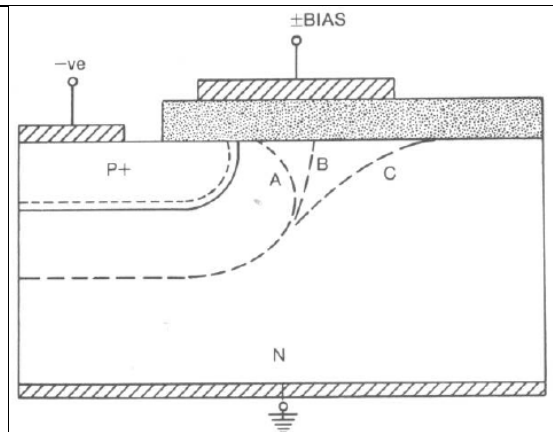
“Baliga text”) and Semiconductor Power Devices (the “Ghandhi text”), and refers to U.S. Patent No. 5,233,215 (the “Baliga patent”).¹⁴ See ‘947 patent at col. 1:45-59. Material incorporated by reference into the specification becomes part of the specification, and thus part of the intrinsic record. *Grantley Patent Holdings, v. Clear Channel Commc’ns, Inc.*, 2008 U.S. Dist. LEXIS 1588, *17 (E.D. Tex. 2008). See also *Advanced Display Sys., Inc. v. Kent State Univ.*, 212 F.3d 1272, 1282 (Fed. Cir. 2000).

The Baliga patent, the Baliga text, and the Ghandhi text each supports the portion of AOS’s proposed construction requiring that the field plate modify the depletion layer. For example, the Baliga text explains how by modifying the depletion layer in the underlying silicon, a field plate reduces an otherwise high concentration of electric field lines and thereby increases breakdown voltage within the termination region:

When a positive bias is applied to the metal field plate with respect to the *N*-type substrate, it will attract electrons to the surface and cause the depletion layer to shrink as illustrated by case A. If a negative voltage is applied to the field plate, it will drive away electrons from the surface, causing the depletion layer to expand as illustrated in case C. The latter phenomenon can be expected to increase the breakdown voltage.

* * *

The presence of the field plate at the diffusion region potential forces the depletion layer to extend at the surface beyond the edge of the field plate. This reduces the depletion layer curvature and reduces the electric field at point A.



Baliga text at 116-117. See also Baliga Patent at col. 4:8-9 (“By altering the potential on the field plate, the depletion layer shape can be adjusted.”); Ghandhi text at 66 (discussing field plates as “an alternate means for control of the depletion layer edge.”); ‘947 patent at col. 1:31-34. To be a field plate or to act as a field plate, a structure must increase the device breakdown voltage in the termination region in the same way as a field plate would, i.e., by modifying the depletion layer in the underlying silicon substrate.

Fairchild cannot avoid the teaching of the specification by now attempting to distinguish the explanatory texts cited by the inventors, or by relying on the testimony of their expert witness,

¹⁴ Sun Decl. Ex. 19; Sun Decl. Ex. 17; Sun Decl. Ex. 20.

Dr. Blanchard. *See* Fairchild Br., at 20:15-21:1 (citing Blanchard Decl., ¶52). In any event, Dr. Blanchard's litigation-inspired description of a field plate is technically incorrect. *See* Salama Opp. Decl., ¶¶ 8, 9 (explaining that, to act as a field plate as claimed in the '947 patent, a conductive ring must modify the depletion layer or depletion region in the underlying semiconductor material).¹⁵

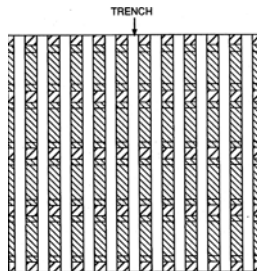
2. The Court Should Reject Fairchild's Attempt To Define "Same" As Including "Different"

Disputed Term	AOS's Proposed Construction	Fairchild's Proposed Construction
A plurality of elongated inner runners extending in the same direction.	Multiple substantially parallel gate trenches filled with a conductive material extending in one direction across the active transistor region.	Conductive structures formed in trenches extending in the same direction across the active area of the device.

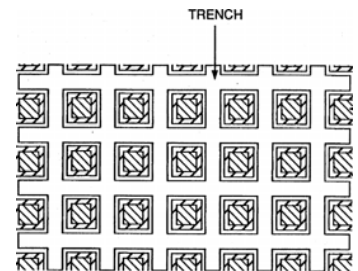
As pertinent here, there are two types of power MOSFETs: "open cell" and "closed cell." On its face, the '947 patent only covers open cell devices. Fairchild's proposed construction would broaden the coverage of the claim to include "closed cell" devices as well.

An open cell MOSFET includes multiple, elongated trenched gates, also known as inner runners, arranged in a "stripe" pattern. Salama Opp. Decl. at ¶ 20. These elongated trenched gates extend in one and only one direction because they are parallel to each other. *Id.* A closed cell MOSFET includes multiple trenched gates arranged in a "grid" pattern:

Open-Cell Design:



Closed-Cell Design:



Id. AOS's proposed construction is supported by the use of the term "same" in the claim language. In the open cell device depicted above, the trenched gates all run in parallel in a north-

¹⁵ Although all of the devices involved in this case are fabricated using silicon, Fairchild objects to the word "silicon" in AOS's proposed construction. *See* Fairchild Br., at 21:3-8. AOS would not object to replacing the word "silicon" with the words "semiconductor material" in its proposed construction. *See* Blanchard Decl. at ¶ 14, 53.

south direction. In the closed cell device depicted above, the trenched gates are running in different directions, *i.e.*, perpendicular to one another.

Relying exclusively on Dr. Blanchard, Fairchild improperly attempts to construe the term *same* to include gates running in *different* directions:

With regard to closed cell designs in particular, the inner runners extend across the active area, and are intersected by runners extending in a different direction. The runners extending in a different direction may or may not extend across the entire active area. But, the fact that there are other runners intersecting the elongated runners does not preclude the elongated inner runners from falling within the scope of the claim language.

Blanchard Decl. at ¶ 54 (emphasis added). The terms “same” and “different” are *antonyms*.

Absent support in the intrinsic evidence for a unique definition, the disputed claim term “same” cannot be stretched to mean its dictionary opposite, “different.” And Fairchild cites no intrinsic evidence supporting its proposed construction in its Opening Brief.¹⁶

3. The Court Should Adopt AOS’s Construction Of The Term “Isolation Trench” And Reject Fairchild’s Proposed Construction; Fairchild’s Proposed Construction Is Based Principally – And Improperly – On Extrinsic Evidence From Its Expert Witness.

Disputed Term	AOS’s Proposed Construction	Fairchild’s Proposed Construction
Isolation trench.	A valley filled with dielectric material surrounded by sidewalls in the periphery of a semiconductor substrate that can prevent leakage into the substrate.	An insulating structure, having a wall near the die edge, which electrically isolates the body region from the die edge.

Claim 1 of the ‘947 patent is limited to power MOSFETs incorporating an “isolation trench.” AOS’s proposed construction is based on the claim language and the specification. Fairchild, on the other hand, proposes a broad construction that is based principally on extrinsic evidence, *viz.*, Dr. Blanchard’s discussion of the purported process for manufacturing power MOSFET devices. *See* Fairchild Br., at 23:1-24:7. Fairchild wants to broaden the meaning of the term “isolation trench” to include “insulating structures” that are not, in fact, isolation trenches so

¹⁶ The prosecution history supports a construction that is limited to open cell designs because the inventors emphasized during prosecution this was the nature of the claimed invention. *See* Sun Ex. 24, Dec. 29, 2003 Amendment, at 13:15-14:1 (emphasizing “inner runners extending in the same direction.”)

1 it can claim that AOS devices that do not actually use isolation trenches infringe its patent.

2 **a. An Isolation Trench Must Actually Be A Trench.**

3 Claim 1 clearly claims an isolation *trench*: “an isolation trench extending into the
4 semiconductor layer” ‘947 patent at col. 6:37-39. The specification also describes an
5 isolation *trench*: “An isolation trench 72, which may be formed at the same time as the trench 28
6” *Id.* at col 4:11-14.

7 Fairchild asks this Court to broaden this limitation term to include any “insulating
8 structure.” The vague term “insulating structure” could encompass many things other than a
9 trench filled with dielectric material. *See Salama Opp. Decl.* at ¶ 16. Fairchild’s proposal is
10 inconsistent with the claim language and specification of the patent, and should be rejected.

11 **b. An Isolation Trench – Like Any Other Trench - Must Have
12 Two Sidewalls.**

13 AOS’s proposed construction requires that the isolation trench have two sidewalls,
14 whereas Fairchild proposes that a trench may have a single sidewall. AOS’s construction is based
15 on the plain meaning of the term “trench” and is supported firmly by the specification.

16 The word “trench” is a common term, well understood by lay persons and experts alike to
17 mean a long, narrow, and deep depression, with two sidewalls. *See, e.g., Sun Decl., Ex. 21,*
18 *McGraw-Hill Dictionary of Scientific and Technical Terms* (5th ed. 1994) at 2065 (defining
19 trench as “a narrow, straight, elongate, U-shaped valley between two mountain ranges”); *Sun*
20 *Decl. Ex. 22, Merriam Webster’s Collegiate Dictionary* (10th ed. 1997) at 1259 (defining trench
21 as “a long, narrow, and usually steep-sided depression in the ocean floor”). If a structure had
22 only one wall, it would be a wall or a step, not a trench. *See Salama Opp. Decl., ¶ 17.*

23 The specification comports with the plain meaning of the term. *First*, the specification
24 uses the term to identify a number of depressions each having two sidewalls. Figure 1 of the ‘947
25 patent shows three trenches 72, 58, and 28, each having two sidewalls:
26
27
28

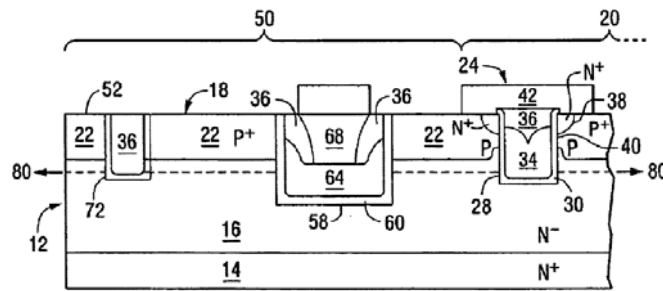


FIG. 1 10

The specification describes “[a]n isolation trench 72, which may be formed at the same time as the trench 28.” ‘947 patent at col. 4:12-14. Both of these structures have two walls. Indeed, throughout the specification *every* structure described as a trench has two sidewalls.

Second, Claim 1 requires that the isolation trench be “positioned between the edge of the device and the second conductor portion.” *Id.* at col. 6:37-38. The specification defines the surface region 52 to be the “die edge.” *See id.* at col. 3:51-52 (“the outer periphery 52, i.e., the die edge.”). As can be seen in Figure 1 of the ‘947 patent, above, the surface region 52 is not the physical boundary of the substrate, rather it is the part of upper surface of the substrate that extends horizontally away from the outer sidewall of the isolation trench 72 to the physical boundary of the substrate. *See id.* at Fig. 1. The upper surface 18 extends horizontally away from the inner sidewall of the isolation trench 72 to the outer sidewall of the gate runner trench 58 (not shown in this figure). *See id.*

Fairchild’s proposed construction – a single-walled structure – is defeated by this intrinsic evidence. To support its proposed construction, Fairchild turns once again to Dr. Blanchard, who says that the term “isolation trench” must include single-walled structures because “[o]ften, isolation trenches are formed between adjacent devices on a wafer, and the singulation step cuts through the isolation region to form separate devices. Thus, one wall of the isolation trench is located on one device, and the other wall is located on another device.” Blanchard Decl., ¶55; *see also* Fairchild Br., at 23:16-28 (challenging AOS’s proposed definition based exclusively on this portion of the Blanchard Declaration).

Unfortunately for Fairchild, nothing in the patent supports a claim covering this type of halved isolation trench. Dr. Blanchard’s purported description of the manufacturing process

cannot broaden the scope of the claim beyond the claim language and the specification. *Phillips*, 415 F.3d at 1318 (“a court should discount any expert testimony that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history”) (citation omitted). In truth, semiconductor device manufacturers do not cut through isolation trenches for at least two reasons. *First*, silicon is softer and thus easier to cut than the oxide in the isolation trenches. *See Salama Opp. Decl.* at ¶ 19. *Second*, MOSFETs are cut from each other using high speed diamond saws approximately 75 to 250 microns wide, whereas a typical isolation trench is only about 1-3 microns wide.¹⁷ *Id.* The trench would have to be made significantly wider than the saw itself in order not to be destroyed by the cutting process. *See id.*

Finally, Fairchild takes issue with the portion of AOS’s proposed construction that describes the purpose of an isolation trench: to “prevent leakage into the substrate.” *See Fairchild Br.*, at 24:1-7. Although the patent does not provide much elaboration on the purpose of the isolation trench, this portion of AOS’s proposed definition is consistent with the understanding of a person of ordinary skill in the art. *See Salama Opp.*, Decl., at ¶ 16.

IV. CONCLUSION

The Court should adopt AOS’s proposed constructions for disputed terms. AOS’s proposed constructions are all firmly based on the intrinsic evidence. Fairchild’s attempt to broaden its asserted claims relying principally on its expert’s declaration should be rejected.

Dated: March 27, 2008

MORGAN, LEWIS & BOCKIUS LLP

By /s/ Daniel Johnson, Jr.
Daniel Johnson, Jr.

Attorneys for Plaintiffs and
Counterdefendants
ALPHA & OMEGA SEMICONDUCTOR,
LTD. AND ALPHA & OMEGA
SEMICONDUCTOR, INC.

¹⁷ The distance from the die edge periphery 52 to the first active trench 28 is only about 20 to 120 microns. ‘947 patent at col. 5:40-45.